

Prevalence Of Traumatic Dental Injuries Among Children And Adolescents: A Review Of Literature

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Abstract: Traumatic dental injuries (TDIs) to primary dentition usually occur when the child learns to walk or fall while playing whereas injuries to permanent dentition can occur during sport activities, fall or collision due to accident, playing or fighting with friends etc. Dental injuries occurring due to sports can be prevented by the use of mouthguard but maximum injuries occur unexpectedly during daily life activities. Prevalence of dental trauma has been reported in different parts of the world and it is seen that wide variation exists. There are various factors investigated such as place and cause of injury, sex predilection, type of trauma, socio-economic factors and malocclusion. The purpose of this article is to present prevalence and risk factors of traumatic dental injuries in children and adolescents.

Keywords: Prevalence, traumatic dental injuries, incisal overjet.

I. INTRODUCTION

Traumatic injuries to the teeth may occur throughout life but are particularly common in children and adolescents since they are engaged in various activities like sports, bicycle riding, fighting with siblings or friends etc. Dental trauma is stressful to both children and their parents. Trauma to anterior teeth in children may adversely affect aesthetics thus having not only functional but psychological effects as well. Researchers have also found that dental problems can negatively affect academic achievement and learning in children. [1] Moreover the cost of dental treatment is also high adding to the financial burden on families. Thus traumatic dental injuries (TDIs) have become an important public health problem and it becomes the role of health professionals to evaluate various predisposing factors related to dental trauma so as to prevent its occurrence. Previous studies have reported

that increased overjet, protruded maxillary incisors and incompetent lips are associated with increase in the occurrence of TDIs.

Literature shows that wide variation exists in the prevalence of TDIs in different parts of the world. This article reviews various prevalence studies of dental trauma and also highlights the associated risk factors investigated by researchers in different parts of the world.

II. REVIEW OF LITERATURE

Oikarinen K et al [2] examined 1152 patients under 20 years of age at Helsinki Health Centre, Helsinki, Finland. It was found that the prevalence of traumatic dental injuries was highest in the age group of 7 to 10 years for girls and in the age group of 11 to 15 years for boys. 46% of the injuries

occurred at school. Most of the injuries were exclusively hard tissue traumas (58%). Causes of trauma were falls or collisions at school (28%) or at home (27%), traffic accidents (11%), accidents due to sports (21%) among which ice-hockey was predominant and due to acts of violence (11%). Violence was the main etiology for tooth injuries among patients aged 16 to 20 years. It was also found that most injuries occurred in winter months. Most injuries were single tooth injuries, but the youngest and the oldest age group involved more cases of 3 or more simultaneous tooth trauma than did the other age groups.

Sanchez AV et al [3] conducted a study to determine the prevalence of traumatic injuries to primary and permanent incisors in 3 to 13 year old 1010 boys from 4 private schools of the city of Monterrey, in northern Mexico. The study revealed that 287 (28.4%) boys had the evidence of traumatic dental injuries. The authors concluded that the prevalence of dental traumatic injuries increases after age 7 and the most common type of injury in the primary and permanent dentitions was the enamel fracture.

Zerman N et al [4] determined the prevalence of traumatic injuries to be 7.3% in 2798 patients, 6 to 21 year old, examined over a 5 year period in the Dental Clinic of the University of Verona, Italy. Large number of traumatic dental injuries occurred in children aged between 6 and 13 years. Males were affected more than females with the male female ratio of 2.7:1. The most frequent causes of injuries were falls and traffic accidents. Most injuries involved two teeth (49%) followed by one tooth (35%), three teeth (10%) and four or more teeth (5%). About 76.6% of the teeth involved were maxillary central incisors followed by maxillary lateral incisors (15.1%), mandibular central incisors (6.2%) and mandibular lateral incisors (2.1%). Fracture of enamel and dentin without pulp involvement (43.8%) was the most frequent type of injury followed by pulp exposure (11.1%) and subluxation (10.3%).

Hargreaves JA et al [5] conducted a study to determine the prevalence of trauma in permanent anterior teeth of 1035, 11 year old children in main ethnic groups in South Africa. The sample selected was children attending primary schools in the Gelukspan district of Bophuthatswana comprising a black rural group; in Soweto, a black urban group; in Lenasia, an urban group of children of Indian descent; and in Johannesburg, two groups, a "colored" (Eur-African Malay) urban group and a white urban group. Results of this study showed that 160 children (15.4 %) experienced dental trauma. Most of the dental trauma was present in white children (21.4%) followed by the colored (15%), Indian (14%), urban blacks (13.7%) and rural blacks (12.9 %). Males showed more dental injuries than the females with an overall ratio of 1.5:1. Most of the injuries involved fracture of enamel only (69%). It was concluded that there was no statistically significant difference in prevalence of trauma among the ethnic groups in South Africa.

Sae-Lim V et al [6] conducted a retrospective study to determine the occurrence of traumatic dental injuries managed by the Dental unit of the Accident and Emergency Department at the Singapore General Hospital. It was found that 461 patients experienced dental trauma during a period of 2 years. The distribution of traumatic dental injuries in different races of Chinese: Malay: Indian: others was 7.3: 1.3: 0.9: 0.5. The

age groups predominantly involved were 2 to 3 years, 3 to 4 years and 17 to 18 years. 71.3% of teeth had luxation type of injuries, 28.7% had fractures, 45.3% had concomitant soft tissue injuries and 13.7% had associated facial bone fractures.

Petti S et al [7] evaluated the relationship between obesity and traumatic dental injuries in 938 children aged 6 to 11 years in Rome (Italy). The children were examined at school. Presence and type of dental injury, overjet, incisor protrusion, upper lip incompetence and presence of obesity were recorded. Results of this study showed that the prevalence of dental injury was 21.3%. In this study obese children had 30.8% dental injuries.

Zaragoza AA et al [8] conducted a study to analyze the prevalence and distribution of dental trauma in children of 6 to 12 years of age from public schools of rural areas in the Spanish Mediterranean coastal province of Valencia. Out of 4000 children examined, 227 presented with dental trauma. Results showed that injury was significantly more in boys (7.8%) than in girls (3.23%). The most common types of fracture were Class I (46.2%) followed by Class II (32.6%). The most common fracture location was mesioincisal angle (40.6%), followed by distoincisal angle (27.3%), horizontal middle third (16.5%) and incisal third (13.3%). 24.2% children with dental injuries presented with overjet of more than 3mm.

Marcenes W et al [9] conducted a cross-sectional survey to determine the prevalence of traumatic dental injuries to the permanent incisors of schoolchildren in Damascus, Syria. The study included 1087 children aged 9 to 12 years attending public and private primary schools. Results of this study showed that the prevalence increased from 5.2% at the age of 9 years to 11.7% at the age of 12 years. Fractures in enamel only and fractures in enamel and dentin were the most commonly sustained type of damage. Acid-etch composite was the most common type of treatment done. There was a tendency for children with an incisal overjet greater than 5 mm to have experienced more dental injuries. Children with inadequate lip coverage were more likely to experience dental injuries than those with adequate lip coverage. In another study conducted by Marcenes W et al [10] the prevalence of traumatic injuries to incisors was found to be 23.7%. The study was carried out among 2684 schoolchildren aged 14 years in Newham, an extremely deprived district in the East end of London. It was also found that treatment of traumatic dental injuries was neglected as 56% of traumatized incisors needed treatment.

Cortes MIS et al [11] carried out a cross-sectional survey to determine the prevalence of traumatic injuries to the permanent teeth of school children aged 9-14 years in Belo Horizonte, Brazil. 3702 boys and girls were examined. Results of this survey showed that the prevalence of dental injuries was 8% at the age of 9 years, 13.6% at the age of 12 years and 16.1% at the age of 14 years. It was shown that boys were 1.7 times more likely to have dental injury than girls and children from high socioeconomic backgrounds were 1.4 times more likely to present with a dental injury than children with low socioeconomic status. It was concluded that children having overjet greater than 5 mm and inadequate lip coverage were more likely to have dental injuries in Brazil.

Nicolau B et al [12] determined the prevalence of traumatic dental injuries among 13 year old children in Cianorte, Brazil. A total of 652 adolescents were examined. Results showed that the prevalence of traumatic injuries to permanent incisors was 20.4%. It was concluded that boys experienced more dental injuries than girls. It was also concluded from this study that being from a non-nuclear family and overweight increased the risk of having traumatic dental injury.

Canakci V et al [13] determined the prevalence of traumatic injuries to the permanent incisors in 13-17 year old adolescents in Erzurum, Turkey. A total of 2180 adolescents were examined. Also, in this study the relationship between dental trauma and handedness was assessed. This study showed that the prevalence of dental trauma was 13.4%. There was higher level of traumatized permanent incisors among left handers (28.3%) than among right handers (11.7%).

Rajab LD [14] analyzed data pertaining to traumatic dental injuries of children seeking care at the teaching clinics of the Department of Pediatric Dentistry, Faculty of Dentistry, University of Jordan from January 1997 to December 2000. During the period of 4 years, 2751 patients, aged 7-15 years attended the teaching clinics. Results showed that the prevalence of traumatic dental injuries was 14.2%. Boys were effected more (18.3%) than girls (10.1%). The peak incidence of injury was 10-12 year age group.

Tapias MA et al [15] determined the prevalence of traumatic crown fractures in a childhood population of Spain. A total of 470 schoolchildren, aged 10 years were examined. Results showed that the prevalence of traumatic crown fractures to permanent incisors was 17.4%. This study showed that boys have a 2.13 fold higher risk of crown fracture than girls and children with overjet greater than 5mm have a 1.81 fold higher risk of traumatic dental injuries.

Soriano EP et al [16] evaluated the risk factors related to traumatic dental injuries in 1150 boys and girls aged 12 years, attending both public and private schools in Recife, Brazil. The prevalence of dental injuries was 23.3%. Children attending public schools presented more traumatic dental injuries (25.86%) than those from private schools (20.69%). In another study conducted by Soriano EP et al, [17] prevalence was found to be 10.5% among 12 year old schoolchildren of Recife, Brazil. It was concluded that children presenting an overjet greater than 5 mm and inadequate lip coverage were more likely to have traumatic dental injuries. Also obese children were more affected.

Artun J et al [18] determined the prevalence of incisor trauma in an adolescent Arab population. The sample comprised of 13 to 14 year old Kuwaiti children, 795 girls and 788 boys. Results of this study showed that the prevalence of dental trauma was higher in boys (19.3%) than in girls (9.7%). Also, traumatic injuries were higher in maxilla (13.6%) than in the mandible (1.5%). Most of the traumatized teeth were maxillary central incisors (83.7%). It was concluded that the risk of dental trauma increased with increase in overjet. No associations were found between occlusion and mandibular incisor trauma.

Sgan-Cohen HD et al [19] conducted an epidemiological survey to measure the prevalence of trauma in permanent anterior teeth among fifth and sixth grade school children in

Jerusalem. A total of 1195 school children were examined. They reported that the prevalence of dental trauma was 29.6%. It was concluded that dental trauma was more prevalent among children with an incisal overjet of 4-6mm, with incompetent lips, who learned in public schools and were males.

Khan NA et al [20] conducted a study to ascertain the prevalence of traumatic dental injuries of the maxillary permanent incisors at Dental Department, Pakistan Institute of Medical Sciences Islamabad during the years 2003-2005. A total of 336 patients aged between 8 to 40 years were examined. Results of this study showed that a large number of dental trauma occurred in patients aged between 9 to 11 years. Males experienced more dental trauma (67.6%) than females (32.4%). Uncomplicated crown fractures were the most commonly encountered dental trauma (41.76%). The main causes were falls (66.9%) followed by collision with objects (11.9%).

Huang B et al [21] carried out a cross-sectional study to assess activities related to the occurrence of traumatic dental injuries in Kaohsiung city in southern Taiwan. The sample consisted of 6312 schoolchildren aged 15 to 18 year. The present study reported that the prevalence of traumatic dental injuries was 19.9%. The major events related with traumatic dental injuries included sports, leisure activities (30.8%), eating (20.5%), falls (19.4%), traffic accidents (10.2%) and collisions (7.1%). It was concluded that leisure related dental injuries were more prevalent among males and high socioeconomic status adolescents. The occurrence of non-accidental traumatic dental injuries was not related to age, gender and socioeconomic status.

Noori AJ et al [22] carried out a cross-sectional survey to determine the prevalence of anterior teeth trauma among 6 to 13 year old, 4015 schoolchildren in Sulaimani city, northern Iraq. Results of this study showed that the prevalence of traumatic dental injuries was 6.1%. The most common type of dental injury was found to be simple enamel fracture (36.6%), followed by enamel dentin fracture (35.4%) and concussion (11.5%).

Navabzham A et al [23] conducted a study to determine the prevalence, etiology and type of injury to maxillary permanent teeth among 9 to 14 year old children living in Yazd, Iran. A sample of 1440 schoolchildren were randomly selected from 24 schools in Yazd. Results of this showed that the prevalence of traumatic dental injuries was 27.56%. Boys (33.05%) experienced more dental injuries than girls (22.08%) The lowest prevalence of dental trauma was found among 14 year old children and the highest prevalence was found among 10 year old children. The most common type of injury in both sexes was enamel fracture only (70.45%), followed by enamel dentin fracture without pulp involvement at 20.45%.

Faus-Damia M et al [24] determined the prevalence of traumatic dental injuries in 6 to 18 year old schoolchildren in Valencia, Spain. A total of 1325 children were examined. They reported that the prevalence of dental injuries was 6.2%. Boys were affected more by dental trauma (51.2%) than girls (48.8%). The highest prevalence of traumatic dental injury was at the age 12.2 years. The main reasons for the trauma were accidents while practising sports (40.2%) followed by falls (31.7%), clenching (11%), blow (8.5%), traffic accident

(2.4%) and remaining 6.1% did not remember. Dental trauma in children with Angle's Class I was more common (39%) followed by combinations of Class II (division I and II) (17.1%) and Class III (9.8%).

Studies conducted in different parts of India have determined different rates of prevalence of traumatic dental injuries. Gupta K et al [25] determined the prevalence of 13.8% in 8 to 14 year old schoolchildren in different urban and rural areas of South Kanara district of Karnataka. Most of the traumatic dental injuries occurred in children aged 11 to 14 years (60.74%). Boys had more dental injuries (66.81%) as compared to girls (33.19%). Most common place of dental trauma was home (68.76%). It was also found in this study that the relation between overjet and prevalence of dental trauma was not statistically significant.

Tangade PS [26] determined the prevalence of anterior teeth fracture in 12 and 15 year old school children in Belgaum city, India. The prevalence of anterior teeth fracture was 4.41%. It was observed that 12 year age group (7.14%) had more fractures than 15 year age group (5.03%). The ratio of prevalence of dental injuries between male and female was 1:0.5. Enamel fractures comprised of 59.54%. It was concluded that there is strong relationship between malocclusion and fractured anterior teeth.

David J et al [27] determined the prevalence of traumatic dental injuries to anterior teeth to be 6.1% in 12 year old school children in Thiruvananthapuram, Kerala, India. It was concluded that 12 year old school children who considered that good marks at school were not important experienced twice the risk of traumatic dental injuries compared with those who considered it as important. Thus it was concluded that negative outlook among adolescents is important for taking risk and this may be one of the causes of dental injury.

Ingle NA et al [28] conducted a study to determine the prevalence of traumatic dental injuries to anterior teeth in 11 to 13 year old school children of Maduravoyal, Chennai, India. A total of 687 students were examined. It was found that the prevalence of traumatic dental injuries was 11.5%. Boys experienced more traumatic dental injuries (78.5%) than girl (21.5%). The most commonly affected teeth were maxillary central incisors (72.2%). Fall was the most common cause of dental trauma (57%) and most common type of fracture was Class I (39.2%).

Ravishankar TL et al [29] conducted a study to determine the prevalence and factors associated with traumatic dental injuries to permanent incisors of 12 year old schoolchildren in Davangere, India. A total of 1020 schoolchildren were examined. The prevalence of traumatic dental injuries to permanent incisors was 15.1%. It was concluded that boys had more traumatic dental injuries as compared to girls. Also, children with overjet greater than 5.5mm and children having inadequate lip coverage were more likely to have traumatic dental injuries.

Gupta S et al [30] carried out a study to determine the prevalence of traumatic dental injuries in school children in Baddi- Barotiwala, Himachal Pradesh, India. A total of 1059 school children aged 4 to 15 years were examined. Results of this study showed that the prevalence was 4.15 %. It was concluded that overjet greater than 3 mm and inadequate lip

coverage were important contributing factors for traumatic dental injuries.

Govindarajan M et al [31] determined the prevalence of 10.13% among 3200 children aged 3-13 years from 10 schools of Chidambaram town, Tamilnadu, India. A total of 416 injured teeth were identified in which 122 were primary teeth and 294 were permanent teeth. Vashisth S et al [32] found the prevalence of 5.12% among 11-14 years old government school children in rural area, Dehra, Kangra District of Himachal Pradesh, India. The awareness regarding emergency care revealed that 63.4% of subjects were aware of emergency care. The knowledge regarding TDI increased with increase in age. Ain TS et al [33] determined the prevalence of TDIs to anterior teeth to be 9.3% in 12 year old school children in Kashmir, India. Falls and sports were the most common causes of trauma. It was found that the highest potential risk factor for the occurrence of trauma was overjet.

III. CONCLUSION

Traumatic dental injuries may adversely affect oral health related quality of life in children. There is a need for greater public awareness regarding dental trauma. Routine dental check up of school children should be done which should include the screening and referral for traumatic dental injuries, as many of these may go unnoticed but still require attention and treatment. The lectures conducted for parents and guardians at schools should focus on the etiology of dental trauma and motivation for immediate treatment of traumatic dental injuries. Physical sports activity at the school should be supervised by the sports teachers all the time and appropriate preventive measures should be made compulsory i.e. helmet, protective mouth guard and face mask. Development of dental occlusion should be supervised. Early orthodontic treatment in predisposed children should be done to minimize the risk of dental trauma.

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